

Register transfer level (RTL) power macromodeling is a mature research topic with a variety of equation and table-based approaches. Despite its maturity, macromodeling is not yet widely accepted as a de facto industrial standard for power estimation at the RT level. Each approach has many variants depending upon the parameters chosen to capture power variation. Every macromodeling technique has some intrinsic limitation affecting either its performance or its accuracy. Therefore, alternative macromodeling methods can be envisaged as part of a power modeling toolkit from which multiple models for a given component could be exploited so as to reduce the estimation errors resulting from conventional single-model approaches. This paper describes two different approaches for a new multi-model power estimation engine. The first one selects the macromodeling technique that leads to the least estimation error, for a given system component, depending on the properties of its input-vector stream. A proper selection function is built after component characterization and used during estimation. Though simple, this approach has revealed a substantial improvement in estimation accuracy. The second one builds a power estimate function that captures the correlation between individual macromodel estimates and input-stream properties. Experimental results show that our multi-model engine improves the robustness of power analysis with negligible usage overhead. Accuracy becomes seven times better on average, as compared to conventional single-model estimators, while the overall maximum estimation error is divided by 9.